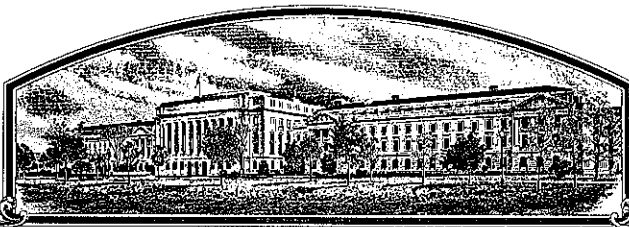


No.

9600154



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

NASH Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME AND CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE ACT. THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BARLEY

'Foster'

In Testimony Whereof, I have herunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this thirty-first day of July in the year of our Lord one thousand nine hundred and ninety-eight.

Attest:

Thomas A. Salt

Acting Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Don Glickman
Secretary of Agriculture



U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate) NDSU Research Foundation		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER ND11055	3. VARIETY NAME 'FOSTER'
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) c/o Executive Director P.O. Box 5014 Fargo, ND 58105-5014		5. TELEPHONE (include area code) 701-231-8931	FOR OFFICIAL USE ONLY PVPO NUMBER 9600154 DATE MARCH 6, 1996 FILING AND EXAMINATION FEE \$2450 DATE 3-6-96 CERTIFICATION FEE \$3000 DATE August 3, 1998
		6. FAX (include area code) 701-231-1013	
7. GENUS AND SPECIES NAME Hordeum vulgare L.	8. FAMILY NAME (Botanical) Gramineae		
9. CROP KIND NAME (Common name) Barley			
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name) 501(c)(3) Corporation - NDSU Research Foundation			
11. IF INCORPORATED, GIVE STATE OF INCORPORATION North Dakota		12. DATE OF INCORPORATION May, 1989	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Richard D. Horsley Department of Plant Sciences North Dakota State University P.O. Box 5051 Fargo, ND 58105-5051 Dale Zetocha Executive Director NDSU Research Foundation P.O. Box 5014 Fargo, ND 58105-5014			14. TELEPHONE (include area code) 701-231-8142
			15. FAX (include area code) 701-231-8474
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)			
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act?) <input checked="" type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input type="checkbox"/> NO (If "no," go to item 20)			
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES (If "yes," give names of countries and dates) <input type="checkbox"/> NO USA-Release date March 17, 1995 USA-First seed sale October 1, 1995			
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s)) Dale Zetocha		SIGNATURE OF APPLICANT (Owner(s))	
NAME (Please print or type) Dale Zetocha		NAME (Please print or type)	
CAPACITY OR TITLE Executive Director NDSU Research Foundation	DATE 3/4/96	CAPACITY OR TITLE	DATE

EXHIBIT A - ORIGIN AND BREEDING HISTORY**'FOSTER'**

- Fall 1985 -Original cross made at North Dakota State University (NDSU) greenhouse.
Pedigree - Robust/ND8310
ND8310 = ND5570/ND5424
ND5570 = Glenn/ND1884/Azure
ND1884 = Nordic/NDB142
NDB142 = Dickson/Trophy
ND5424 = Glenn/Karl
- Spring 1986 -F1 plants grown in NDSU greenhouse.
- Summer 1986 -F2 spaced plants grown on NDSU research land.
-F2 population number is C85-38.
-Selection of F2 plants was based on maturity, plant height, awn type, and spike fertility.
- Summer 1987 -F3 head rows grown on NDSU research land.
-Individual F3 families were selected. Selection of families was based on maturity, plant height, straw strength, kernel color, awn type, spike length, spike erectness, and spike density.
-Within each family, three spikes were randomly selected from different plants. Two spikes were sent to the winter nursery near Weslaco, TX and the third spike was stored as remnant seed in case of a crop failure at the winter nursery.
-After selection of individual spikes, the remainder of each family was harvested.
- Winter 1987-88 -F4 head rows are grown at the winter nursery near Weslaco, TX for seed increase.
-Grain from harvested F3 head rows were evaluated for potential malting quality by the Department of Cereal Science and Food Technology (CSFT), NDSU. Parameters evaluated were barley grain protein, kernel assortment, kernel color, and barley diastatic power.
- Spring 1988 -Based on data from CSFT, selected F4 head rows are individually harvested.
-Seed from each F4 row is sown in preliminary yield trials.
- Summer 1988 -Experimental line designation - ND11055.
-F5 preliminary yield trial is grown at two locations in ND on NDSU research land.

- Fall 1988
- Grain of "best" entries, including ND11055, is sent to the USDA-ARS Cereal Crops Research Unit, Madison, WI for malt quality evaluation. Barley and malt quality parameters evaluated include kernel plumpness and weight, barley protein, malt extract, fine-coarse malt extract difference, wort protein, β -glucan content, malt diastatic power, and α -amylase activity.
 - Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
 - All entries sent to Madison are screened for net blotch and spot blotch resistance in the greenhouse by the Department of Plant Pathology, NDSU.
- Spring 1989
- Based on favorable agronomic and malt quality data, ND11055 is advanced to intermediate yield trials.
- Summer 1989
- F6 intermediate yield trial is grown at four locations in ND on NDSU research land.
- Fall 1989
- Grain of "best" entries, including ND11055, is sent to the USDA-ARS Cereal Crops Research Unit, Madison, WI for malt quality evaluation.
 - Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
- Spring 1990
- Based on favorable agronomic and malt quality data, ND11055 is advanced to advanced yield trials and submitted for entry in the Mississippi Valley Barley Nursery.
- Summer 1990
- F7 advanced yield trials is grown at four locations in ND on NDSU research land.
 - Mississippi Valley Barley Nursery is grown at about 15 locations each year in the Upper Midwest U.S.A. and southern Manitoba, Canada.
- Fall 1990
- Grain of "best" entries, including ND11055, is sent to the USDA-ARS Cereal Crops Research Unit, Madison, WI for malt quality evaluation.
 - Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
 - Pilot scale malting evaluation by the American Malting Barley Association, Inc. (AMBA) is conducted. Pilot scale malting evaluation is done by the malting and brewing industry members of AMBA. Only malting quality is evaluated. Barley and malt quality parameters evaluated are similar to those evaluated by the USDA-ARS in Madison.
- Spring 1991
- Based on favorable agronomic and malt quality data, ND11055 is advanced to varietal yield trials and submitted for entry in the Mississippi Valley Barley Nursery.

- Summer 1991
- F8 varietal yield is grown at four locations in ND on NDSU research land.
 - Mississippi Valley Barley Nursery is grown at about 15 locations each year in the Upper Midwest U.S.A. and southern Manitoba, Canada.
- Fall 1991
- Grain of "best" entries, including ND11055, is sent to the USDA-ARS Cereal Crops Research Unit, Madison, WI for malt quality evaluation.
 - Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
 - Pilot scale malting evaluation is conducted by AMBA. Malting quality is evaluated. Brewing quality also is evaluated on beer produced in a micro pilot brewery.
- Spring 1992
- Based on favorable agronomic and malt quality data, ND11055 is advanced to varietal yield trials, North Dakota state varietal yields trials, and submitted for entry in the Mississippi Valley Barley Nursery.
- Summer 1992
- F9 varietal yield trial is grown at four locations in ND on NDSU research land.
 - Mississippi Valley Barley Nursery is grown at about 15 locations each year in the Upper Midwest U.S.A. and southern Manitoba, Canada.
 - ND barley varietal trial is grown at seven locations in ND on NDSU research land.
 - Head row purification is grown at Casselton, ND.
 - ND11055 is sown on about 700 acres in North Dakota to provide grain for AMBA plant scale evaluation.
- Fall 1992
- Plant scale malting and brewing evaluation by AMBA. Plant scale evaluation entails the following. About 50,000 bushels of ND11055 grain are malted and evaluated by one member of AMBA. Malt then is distributed to the three brewing members of AMBA for plant scale brewing and evaluation.
- Spring 1993
- Based on favorable agronomic and malt quality data, ND11055 is advanced to varietal yield trials, North Dakota state varietal yields trials, and submitted to the Mississippi Valley Barley Nursery.
- Summer 1993
- Varietal yield trial is grown at four locations in ND on NDSU research land.
 - Mississippi Valley Barley Nursery is grown at about 15 locations each year in the Upper Midwest U.S.A. and southern Manitoba, Canada.
 - ND barley varietal trial is grown is grown at seven locations in ND on NDSU research land.
 - Seed increase of ND11055 is grown at Casselton, ND.
 - ND11055 is sown on about 700 acres in North Dakota to provide grain

for AMBA plant scale evaluation.

- Fall 1993 -Grain of ND11055 is rejected by AMBA for plant scale evaluation because of excessive kernel blight incited by several *Fusarium spp.*
- Summer 1994 -Varietal yield trial is grown at four locations in ND on NDSU research land.
 -Mississippi Valley Barley Nursery is grown at about 15 locations each year in the Upper Midwest U.S.A. and southern Manitoba, Canada.
 -ND barley varietal trial is grown at seven locations in ND on NDSU research land.
 -Seed increase of ND11055 is conducted at Casselton, Carrington, and Minot, ND.
 -ND11055 is sown on about 700 acres in North Dakota to provide grain for AMBA plant scale evaluation.
- Fall 1994 -Grain of ND11055 is rejected by AMBA for plant scale evaluation because of excessive kernel blight incited by several *Fusarium spp.*
- Winter 1994-95 -ND11055 is released as a named cultivar, Foster, the unselected progeny of a bulk of F9 head rows similar in plant height and heading date on March 17, 1995.
- Summer 1995 -Varietal yield trial is grown at four locations in ND on NDSU research land.
 -Mississippi Valley Barley Nursery is grown at about 15 locations each year in the Upper Midwest U.S.A. and southern Manitoba, Canada.
 -ND barley varietal trial is grown at seven locations in ND on NDSU research land.
 -Foster is sown on about 700 acres in North Dakota to provide grain for AMBA plant scale evaluation.
- Fall 1995 Plant scale malting and brewing evaluation was conducted by AMBA. Status as a "barley recommended for malting and brewing" by AMBA should be decided by late summer 1996.

Foster was observed for five generations from 1993 to 1997, and was observed to be uniform and stable within commercially acceptable limits for all traits as described in Exhibit C. Foster has been rogued in all generations subsequent to the purification in 1992. Variants (i.e., similar height two-rowed barley plants and slightly taller very rough awned plants) occur at a frequency of less than 1/10,000 and 1/30,000, respectively.

EXHIBIT B - NOVELTY STATEMENT

To my knowledge, Foster most nearly resembles Hazen and Excel barley. DNA analysis using polymerase chain reaction (PCR) techniques (Williams et al., 1990) using simple sequence repeat (SSR) markers (Liu et al., 1996) can easily differentiate Foster from Hazen and Excel. Using Research Genetics, Inc. (Huntsville, AL) primer HVM 68, a 210 base pair (bp) band can be found in Foster that is not present in Hazen or Excel. Using Research Genetics, Inc. primer HVM 62, a 250 bp band can be found in Foster that is not present in Hazen or Excel.

Figure 1 presents a scan of a photo showing the "critical" 210 bp band. Figure 2 presents a scan of a photo showing the "critical" 250 bp band. The original photos that were scanned also are included. In Figures 1 and 2, duplicate lanes of Foster, Excel, and Hazen that contain bands of varying sizes can be seen. The lane markers on the outside of the photo can be used to determine the size of the critical bands found exclusively in Foster.

Methods

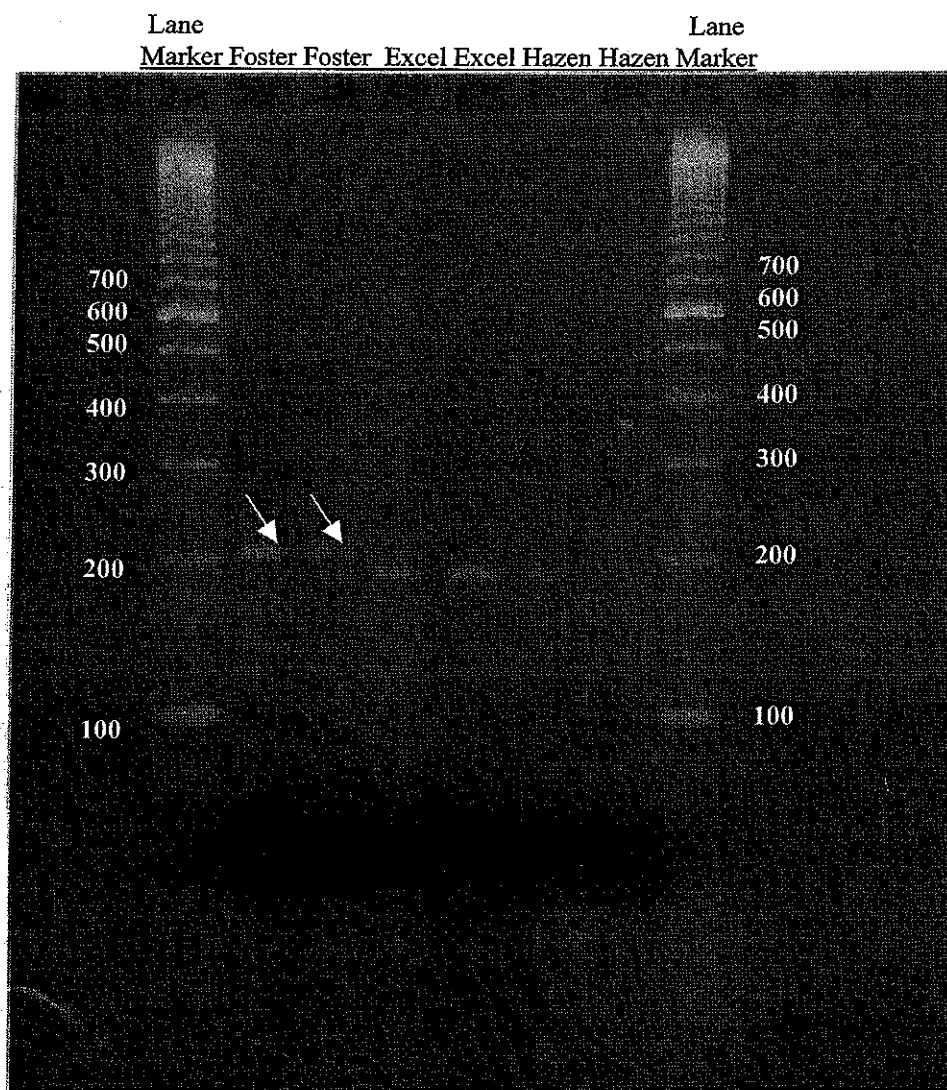
Leaf tissue was collected from Hazen, Excel, and Foster barley and stored at -80 °C. DNA was extracted from the leaf tissue using the CTAB method of Doyle and Doyle (1987). The three cultivars were screened for SSR polymorphisms using the method of Liu et al. (1996). Reaction conditions were as follows: 2 mM MgCl₂; 100 µM of each dATP, dCTP, dGTP, and dTTP; 5 ng of primer; 50 ng of genomic DNA; and 1.5 units Taq DNA polymerase (Promega; Madison, WI), and 1x of Taq buffer. The reaction volume was 20.0 µL. Amplification reactions were done with a Perkin-Elmer DNA thermocycler using the "touchdown PCR protocol described in Liu et al. (1996). This protocol consists of 18 cycles of 94 °C for 1 min DNA denaturation and 72 °C for 1 min extension. Annealing (30 s) temperatures were progressively decreased by 1 °C every second from 64 °C to 55 °C. The PCR reaction continued for 30 additional cycles at 94 °C for 1 min, 55 °C for 1 min and 72 °C for 1 min. The reaction ended with a 5-min extension at 72 °C. Reactions were held at 4 °C until separated in an agarose gel by electrophoresis. Amplified products were separated in a Metaphore agarose (FMC BioProducts; Rockland, ME) gel at 16 volt/hour. Gels were stained with ethidium bromide and viewed using a UV light box. Photographs were taken for a permanent record.

Literature Cited

- Doyle, J.J., and J.L. Doyle. 1987. A rapid DNA isolation procedure for small quantities of fresh leaf tissue. *Phytochemistry Bulletin* 19:11-15.
- Liu, Z.-W, R.M. Biyashev, M.A. Saghai Maroof. 1996. Development of simple sequence repeat DNA markers and their integration into a barley linkage map. *TAG* 93:869-876.
- Williams, J.G.K., A.R. Kubelik, K.J. Livak, J.A. Rafalski, and S.V. Tingey. 1990. DNA polymorphisms amplified by arbitrary primers are useful as genetic markers. *Nucleic Acids Res.* 18:6531-6535.

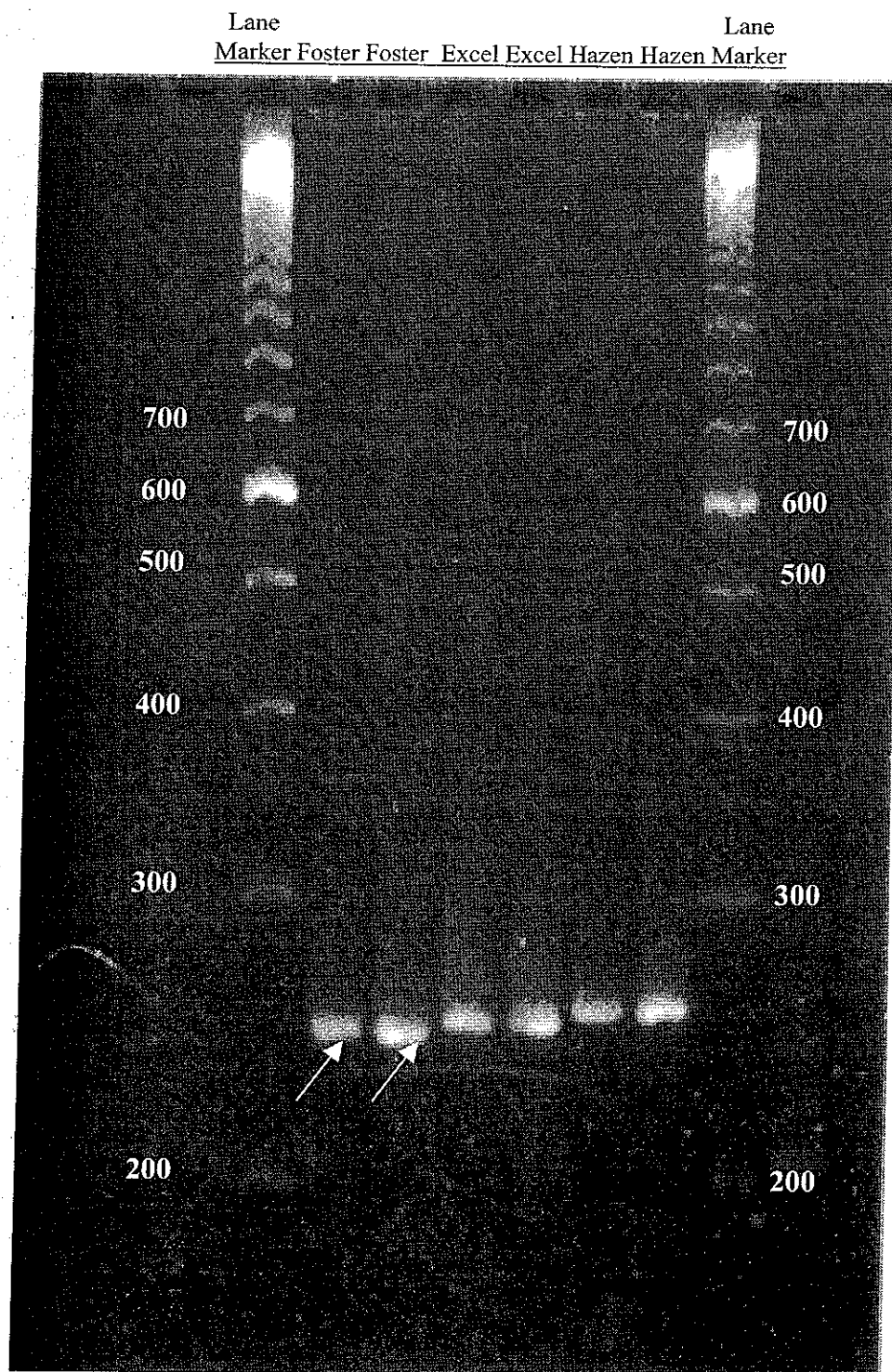
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Figure 1. Agarose gel showing a 210 base pair (bp) simple sequence repeat (SSR) polymorphism, using Research Genetics, Inc. primer HVM 68, that distinguishes Foster barley from Hazen and Excel barley.



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Figure 2. Agarose gel showing a 250 base pair (bp) simple sequence repeat (SSR) polymorphism, using Research Genetics, Inc. primer HVM 62, that distinguishes Foster barley from Hazen and Excel barley.

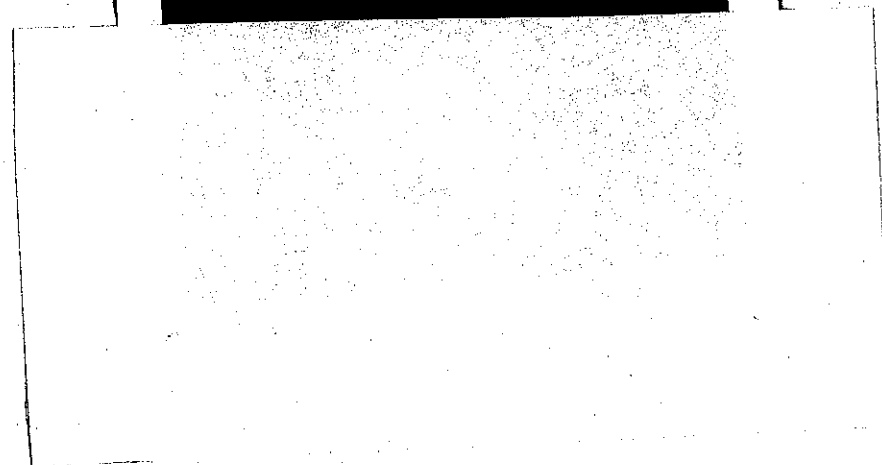
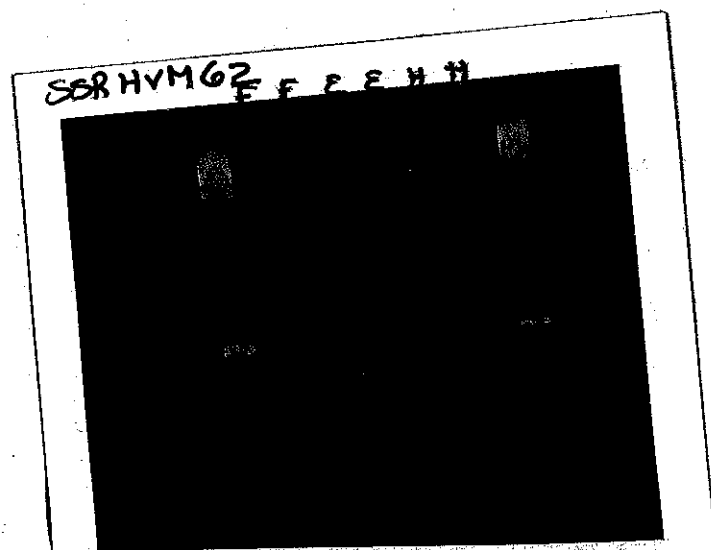


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SSR HVM 68 E E H H



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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY
BARLEY (*HORDEUM VULGARE*)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)

NDSU Research Foundation

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

Box 5014

Fargo, ND 58105-5014

FOR OFFICIAL USE ONLY

PVPO NUMBER

9600154

VARIETY NAME OR TEMPORARY DESIGNATION

'Forster'

Place the appropriate number that describes the varietal character of this variety in the boxes below.

Place a zero in first box (i.e. or) when number is either 99 or less or 9 or less.

1. GROWTH HABIT:

1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE
3 = ERECT

2. MATURITY (50% Flowering):

1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier)

No. of days Earlier than } 1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON
 No. of days Later than } 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

3. PLANT HEIGHT (From soil level to top of head):

1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (Betzes) 4 = TALL (Conquest)

Cm. Shorter than } 1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON
 Cm. Taller than } 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

4. STEM:

Exertion (Flag to spike at maturity): 1 = 0 - 3 cm. 2 = 3 - 10 cm. Anthocyanin: 1 = ABSENT 2 = PRESENT
3 = 10 - 15 cm.

NO. OF NODES (Originating from node above ground)

Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN Shape of Neck: 1 = STRAIGHT 2 = SNAKY
4 = MODIFIED CLOSED OR OPEN 3 = OTHER (Specify) short curved

5. LEAF:

Basal leaf sheath (seedling): 1 = GLABROUS 2 = PUBESCENT Position of flag leaf (at boot stage): 1 = DROOPING
2 = UPRIGHT

Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY MM. WIDTH (First leaf below flag leaf)
3 = WAXY

CM. LENGTH (First leaf below flag leaf) Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT

6. HEAD:

Type: 1 = TWO-ROWED 2 = SIX-ROWED Density: 1 = LAX 2 = ERECT (Not dense)
3 = ERECT (Dense)

Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY
4 = OTHER (Specify) 3 = WAXY

Lateral Kernels Overlap: 1 = NONE 2 = AT TIP Rachis (Hair on edge): 1 = LACKING 2 = FEW 3 = COVERED
3 = 1/4 - 1/2 OF HEAD

7. GLUME:

Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA Hairs: 1 = NONE 2 = SHORT 3 = LONG
3 = MORE THAN 1/2 OF LEMMA

Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES
3 = MORE THAN EQUAL TO LENGTH OF GLUMES

Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

8. LEMMA:

- ☐ 5 Awn: 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS
3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike)
5 = LONG (longer than spike) 6 = HOODED
- ☐ 3 Awn Surface: 1 = AWNLESS 2 = SMOOTH 3 = SEMISMOOTH 4 = ROUGH
- ☐ 3 Teeth: 1 = ABSENT 2 = FEW 3 = NUMEROUS ☐ 1 Hair: 1 = ABSENT 2 = PRESENT
- ☐ 3 Shape of base: 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE ☐ 2 Rachilla Hairs: 1 = SHORT 2 = LONG

9. STIGMA:

- ☐ 1 Hairs: 1 = FEW 2 = MANY

10. SEED:

- ☐ 2 Type: 1 = NAKED 2 = COVERED ☐ 1 Hairs on Ventral Furrow: 1 = ABSENT 2 = PRESENT
- ☐ 4 Length: 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.)
4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)
- ☐ 2 Wrinkling of hull: 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED
- ☐ 1 Aleurone Color: 1 = COLORLESS (White or Yellow) 2 = BLUE
- ☐ 5 PERCENT ABORTIVE ☐ 3 ☐ 3 GMS. PER 1000 SEEDS

11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

- | | | | |
|---------------------------------------|---|---|---|
| <input type="checkbox"/> 1 SEPTORIA | <input type="checkbox"/> 1 NET BLOTCH | <input type="checkbox"/> 2 SPOT BLOTCH | <input type="checkbox"/> 1 POWDERY MILDEW |
| <input type="checkbox"/> 1 LOOSE SMUT | <input type="checkbox"/> 2 BACTERIAL BLIGHT | <input type="checkbox"/> 1 COVERED SMUT | <input type="checkbox"/> 1 FALSE LOOSE SMUT |
| <input type="checkbox"/> 1 STEM RUST | <input type="checkbox"/> 1 LEAF RUST | <input type="checkbox"/> 1 SCAB | <input type="checkbox"/> 1 SCALD |
| <input type="checkbox"/> 0 AY | <input type="checkbox"/> 2 BSMV | <input type="checkbox"/> 1 BYDV | <input type="checkbox"/> OTHER (Specify) |

12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

- | | | | |
|--|---|--|-------------------------------------|
| <input type="checkbox"/> 0 GREEN BUG | <input type="checkbox"/> 0 ENGLISH GRAIN APHID. | <input type="checkbox"/> 0 CHINCH BUG | <input type="checkbox"/> 0 ARMYWORM |
| <input type="checkbox"/> 0 GRASS HOPPERS | <input type="checkbox"/> 0 CEREAL LEAF BEETLE | <input type="checkbox"/> 0 OTHER (Specify) | |
| HESSIAN FLY RACES | <input type="checkbox"/> 0 GP | <input type="checkbox"/> 0 A | <input type="checkbox"/> 0 B |
| | <input type="checkbox"/> 0 D | <input type="checkbox"/> 0 E | <input type="checkbox"/> 0 C |
| | | <input type="checkbox"/> 0 F | <input type="checkbox"/> 0 G |

13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

- ☐ 0 DDT ☐ OTHER (Specify)

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Hazen	Seed size	Hazen
Leaf size	Hazen	Coleoptile elongation	Hazen
Leaf color	Hazen	Seedling pigmentation	Hazen
Leaf carriage	Hazen		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

EXHIBIT D - ADDITIONAL DESCRIPTION OF VARIETY

When Foster is compared with Hazen, Foster is shorter in plant height and greater in malt extract. When Foster is compared with Excel, Foster has plumper grain. Levels of plump grain are determined as the percent of grain retained on a sieve with 0.24- by 1.9-cm slotted openings.

EXHIBIT E - STATEMENT OF THE BASIS OF THE APPLICANT'S OWNERSHIP

Dr. Richard Horsley, an employee of the North Dakota Agricultural Experiment Station and North Dakota State University, is a plant breeder who developed 'FOSTER', the six-rowed spring barley cultivar for which Plant Variety Protection is hereby sought. The employee by agreement and because of the condition of the use of the facilities and funds of the North Dakota Agricultural Experiment Station and North Dakota State University has assigned all ownership rights to 'FOSTER' barley to the North Dakota Agricultural Experiment Station and North Dakota State University.

North Dakota State University on behalf of the North Dakota Agricultural Experiment Station has assigned all ownership to the NDSU Research Foundation. The NDSU Research Foundation is a nonprofit corporation set up to own and manage the intellectual property of North Dakota State University.